

What is claimed is:

1. A method for releasing Packet Data Protocol (PDP) contexts relating to data sessions held by a data processing unit (GTP-U) of a Gateway General Packet Radio Service (GPRS) Support Node (GGSN) having a plurality of data processing units (GTP-U's), the method comprising the steps of:
 - 5 i) detecting a failure or a shutdown of one of the GTP-U's;
 - ii) detecting at least one control unit (GTP-C/s) that controlled data sessions supported by the failed or shutdown GTP-U; and
 - iii) deleting on the at least one GTP-C/s the PDP Context related to the data sessions supported by the failed or shutdown GTP-U.
2. The method claimed in claim 1, wherein the step of detecting a failure or a shutdown of one of the GTP-U's is performed at least partially by a master control unit (GTP-C/m) of the GGSN.
3. The method claimed in claim 2, the method further comprising, following the step of detecting, the step of:
 - the GTP-C/m removing all its internal connections related to the failed or shutdown GTP-U.
4. The method claimed in claim 1, further comprising the steps of:
 - detecting if the GGSN comprises a spare, non-utilized, GTP-U unit; and
 - if the GGSN does not comprise a spare, non-utilized, GTP-U unit,
 - 5 performing steps ii) and iii).

5. The method claimed in claim 2, wherein step iii) comprises the step of:

iv) sending a Delete PDP Context request message from the GTP-C/m to each one of the at least one GTP-C/s, the request message instructing each one of the at least one GTP-C/s to delete the PDP Contexts related to the failed or shutdown GTP-U.

6. The method claimed in claim 5, wherein step iv) further comprises the step of:

sending a Delete PDP Context request message from each one of the at least one GTP-C/s to a Service GRPS support node associated with the GGSN for providing the data session for mobile terminals, the request message instructing the GPRS to delete one or more PDP Contexts related to the failed or shutdown GTP-U.

7. The method claimed in claim 2, further comprising, following step iii), the step of:

sending a Route Update request from the GTP-C/m to a Routing Engine (RE) for requesting a route update of routes related to lost data sessions supported by the failed or shutdown GTP-U.

8. A Gateway General Packet Radio Service (GPRS) Support Node (GGSN) comprising:

a plurality of data sessions processing units (GTP-U/s) for supporting data sessions for mobile terminals;

5 a plurality of data session control units (GTP-C/s) for controlling the data sessions;

a master control unit (GTP-C/m) of the GGSN detecting a failure or a shutdown of one of the GTP-U/s;

10 wherein the GTP-C/m detects at least one GTP-C/s that controlled data sessions supported by the failed or shutdown GTP-U, and requests deletion of the PDP Context related to the data sessions supported by the failed or shutdown GTP-U the at least one GTP-C/s.

9. The GGSN claimed in claim 8, wherein after it detects the failure or the shutdown of the GTP-U, the GTP-C/m removes all its internal connections related to the failed or shutdown GTP-U.

10. The GGSN claimed in claim 8, wherein the GTP-C/m detects if the GGSN comprises a spare, non-utilized, GTP-U unit, and if the GGSN does not comprise a spare, non-utilized, GTP-U unit, the GTP-C/m detects at least one GTP-C/s that controlled data sessions supported by the failed or shutdown GTP-U, and requests
5 deletion of the PDP Context related to the data sessions supported by the failed or shutdown GTP-U on the at least one GTP-C/s.

11. The GGSN claimed in claim 8, wherein the GTP-C/m sends a Delete PDP Context request message to each one of the at least one GTP-C/s, the request message instructing the at least one GTP-C/s to delete the PDP Contexts related to the failed or shutdown GTP-U.

12. The GGSN claimed in claim 11, wherein each one of the at least one GTP-C/s send a Delete PDP Context request message to a Service GPRS support node associated with the GGSN for providing the data session for mobile terminals, the request message instructing the GPRS to delete the PDP Contexts related to the
5 failed or shutdown GTP-U.

13. The GGSN claimed in claim 8, wherein following deletion of the PDP contexts, the GTP-C/m sends a Route Update request to a Routing Engine (RE) for requesting a route update of routes related to lost data sessions supported by the failed or shutdown GTP-U.

14. A method for replacing a failed data session processing unit (GTP-U) supporting one or more data sessions for mobile terminals on a Gateway General Packet Radio Service (GPRS) Support Node (GGSN), the method comprising the steps of:

- 5 i) detecting a failure or a shutdown of the GTP-U of the GGSN;
 ii) activating a spare GTP-U of the GGSN; and
 iii) rebuilding the plurality of data sessions on the spare GTP-U.

15. The method claimed in claim 14, wherein the step of detecting a failure or a shutdown of one of the GTP-U's is performed at least partially by a master data session control unit (GTP-C/m) of the GGSN.

16. The method claimed in claim 14, wherein the step of detecting a failure or a shutdown of one of the GTP-U's comprises the step of:

receiving in the GTP-C/m a Failure Detection message indicative of the failure or shutdown of the GTP-U.

17. The method claimed in claim 14, further comprising the steps of:

detecting if the GGSN comprises a spare, non-utilized, GTP-U unit; and

if the GGSN comprises a spare, non-utilized, GTP-U unit, performing steps ii) and iii).

18. The method claimed in claim 15, wherein step iii) comprises the steps of:

transmitting a failed GTP-U rebuild request from the GTP-C/m to each data session control unit (GTP-C/s) of the GGSN that controlled the one or more data sessions;

5 responsive to the GTP-U rebuild request, sending from each GTP-C/s to the spare GTP-U, information related to the Packet Data Protocol (PDP) Context of the one or more data sessions, the information being used by the spare GTP-U to rebuild the one or more data sessions previously supported by the failed GTP-U.

19. The method claimed in claim 18, wherein the information is sent in a plurality of Spare GTP-U Activate Session messages, each one of the plurality of messages comprising one PDP context of one data sessions of the one or more data sessions.

20. The method claimed in claim 14, wherein following the step iii), the method further comprises the step of:

5 sending a Route Update message from the GTP-C/m to a Routing Engine for requesting a route update of routes related to lost data sessions supported by the failed or shutdown GTP-U.

21. A Gateway General Packet Radio Service (GPRS) Support Node (GGSN) comprising:

a plurality of data sessions processing units (GTP-Us) for supporting one or more data sessions for mobile terminals;

5 a plurality of data session control units (GTP-C/s) for controlling the one or more data sessions;

a master control unit (GTP-C/m) of the GGSN detecting a failure or a shutdown of one of the GTP-Us;

10 wherein when the GTP-C/m detects the failure or the shutdown of one of the GTP-Us, it activates a spare GTP-U of the GGSN and instructs rebuilding the one or more data sessions on the spare GTP-U.

22. The GGSN claimed in claim 21, wherein the GTP-C/m receives a Failure Detection message indicative of the failure or shutdown of the GTP-U.

23. The GGSN claimed in claim 21, further wherein the GTP-C/s detects if the GGSN comprises a spare, non-utilized, GTP-U unit, and if so, activates the spare GTP-U of the GGSN and instructs rebuilding the one or more data sessions on the spare GTP-U.

24. The GGSN claimed in claim 21, wherein for rebuilding the one or more data sessions on the spare GTP-U, the GTP-C/m transmits a failed GTP-U rebuild request to each GTP-C/s of the GGSN that controlled the one or more data sessions, and responsive to the GTP-U rebuild request, each GTP-C/s send to the
5 spare GTP-U information related to the Packet Data Protocol (PDP) Context of the one or more data sessions, the information being used by the spare GTP-U to rebuild the one or more data sessions previously supported by the failed GTP-U.

25. The GGSN claimed in claim 24, wherein the information is sent in a plurality of Spare GTP-U Activate Session messages, each one of the plurality of messages comprising one PDP context of one data sessions of the one or more data sessions.

26. The GGSN claimed in claim 21, wherein following the one or more data sessions on the spare GTP-U, the GTP-C/m sends a Route Update message from the GTP-Cm to a Routing Engine for requesting a route update of routes related to
5 lost data sessions supported by the failed or shutdown GTP-U.